

CLAIMS *cancel*

1. A semiconductor device having a plurality of pyramidal bump electrodes respectively bonded onto pad electrodes arranged on a semiconductor chip.
2. A semiconductor device having a plurality of pyramidal bump electrodes respectively bonded through an anisotropic conduction film onto pad electrodes arranged on a semiconductor chip.
3. A semiconductor device having a plurality of pyramidal bump electrodes respectively bonded by thermal compression onto pad electrodes arranged on a semiconductor chip.
4. A semiconductor device having a plurality of pyramidal bump electrodes respectively bonded by thermal compression onto pad electrodes arranged on a semiconductor chip so that said pyramidal bump electrodes and said pad electrodes can form an alloy at the junctions by said thermal compression.
5. A semiconductor device having a plurality of pyramidal bump electrodes respectively bonded onto rewired metal conduction pads that are electrically connected to pad electrodes arranged on a semiconductor chip.
6. A semiconductor device according to any one of claims 1 to 5, wherein a base material of said pyramidal bump electrodes is made of hard nickel, Ni.
7. A semiconductor device according to any one of claims 1 to 5, wherein a base material of said pyramidal

Sub  
B1

Sub  
A17

bump electrodes is made of soft copper, Cu.

8. A mounting structure in a semiconductor device having a plurality of pyramidal bump electrodes respectively bonded onto pad electrodes arranged on a semiconductor chip, said mounting structure enabling said semiconductor device to be mounted on a substrate by respectively bonding said pyramidal bump electrodes onto terminals formed on said substrate. *cancel*

9. A mounting structure in a semiconductor device having a plurality of pyramidal bump electrodes respectively bonded through an anisotropic conduction film onto pad electrodes arranged on a semiconductor chip, said mounting structure enabling said semiconductor device to be mounted on a substrate by respectively bonding said pyramidal bump electrodes onto terminals formed on said substrate.

10. A mounting structure in a semiconductor device having a plurality of pyramidal bump electrodes respectively bonded by thermal compression onto pad electrodes arranged on a semiconductor chip, said mounting structure enabling said semiconductor device to be mounted on a substrate by respectively bonding said pyramidal bump electrodes onto terminals formed on said substrate.

11. A mounting structure in a semiconductor device having a plurality of pyramidal bump electrodes respectively bonded by thermal compression onto pad electrodes arranged on a semiconductor chip so that said

Pub B2

pyramidal bump electrodes and said pad electrodes can form an alloy at the junctions by said thermal compression, said mounting structure enabling said semiconductor device to be mounted on a substrate by respectively bonding said pyramidal bump electrodes onto terminals formed on said substrate.

12. A mounting structure in a semiconductor device having a plurality of pyramidal bump electrodes respectively bonded onto pad electrodes arranged on a semiconductor chip, said mounting structure enabling said semiconductor device to be mounted on a substrate by respectively soldering said pyramidal bump electrodes onto terminals formed on said substrate.

13. A mounting structure in a semiconductor device having a plurality of pyramidal bump electrodes respectively bonded through an anisotropic conduction film onto pad electrodes arranged on a semiconductor chip, said mounting structure enabling said semiconductor device to be mounted on a substrate by respectively soldering said pyramidal bump electrodes onto terminals formed on said substrate.

14. A mounting structure in a semiconductor device having a plurality of pyramidal bump electrodes respectively bonded by thermal compression onto pad electrodes arranged on a semiconductor chip, said mounting structure enabling said semiconductor device to be mounted on a substrate by respectively soldering said pyramidal bump electrodes onto terminals formed on said

B2  
cont

substrate.

15. A mounting structure in a semiconductor device having a plurality of pyramidal bump electrodes respectively bonded by thermal compression onto pad electrodes arranged on a semiconductor chip so that said pyramidal bump electrodes and said pad electrodes can form an alloy at the junctions by said thermal compression, said mounting structure enabling said semiconductor device to be mounted on a substrate by respectively soldering said pyramidal bump electrodes onto terminals formed on said substrate.

16. A mounting structure in a semiconductor device having a plurality of pyramidal bump electrodes respectively bonded onto pad electrodes arranged on a semiconductor chip, said mounting structure enabling said semiconductor device to be mounted on a substrate by respectively bonding said pyramidal bump electrodes onto terminals formed on said substrate and by bonding said semiconductor device to said substrate with an adhesive.

17. A mounting structure in a semiconductor device having a plurality of pyramidal bump electrodes respectively bonded through an anisotropic conduction film onto pad electrodes arranged on a semiconductor chip, said mounting structure enabling said semiconductor device to be mounted on a substrate by respectively bonding said pyramidal bump electrodes onto terminals formed on said substrate and by bonding said

B2  
cont

semiconductor device to said substrate with an adhesive.

18. A mounting structure in a semiconductor device having a plurality of pyramidal bump electrodes respectively bonded by thermal compression onto pad electrodes arranged on a semiconductor chip, said mounting structure enabling said semiconductor device to be mounted on a substrate by respectively bonding said pyramidal bump electrodes onto terminals formed on said substrate and by bonding said semiconductor device to said substrate with an adhesive.

19. A mounting structure in a semiconductor device having a plurality of pyramidal bump electrodes respectively bonded by thermal compression onto pad electrodes arranged on a semiconductor chip so that said pyramidal bump electrodes and said pad electrodes can form an alloy at the junctions by said thermal compression, said mounting structure enabling said semiconductor device to be mounted on a substrate by respectively bonding said pyramidal bump electrodes onto terminals formed on said substrate and by bonding said semiconductor device to said substrate with an adhesive.

20. A mounting structure according to any one of claims 8 to 19, wherein a base material of said pyramidal bump electrodes in said semiconductor device is made of hard nickel, Ni.

21. A mounting structure according to any one of claims 8 to 19, wherein a base material of said pyramidal bump electrodes in said semiconductor device

B2  
level

Sub  
A27

is made of soft copper, Cu.

22. A method of producing a semiconductor device comprising the steps of:

forming, by photolithographic etching, pyramidal holes in a base having a particular crystal orientation plane in order to oppose a plurality of pad electrodes arranged on a semiconductor chip;

forming on said base a pattern of an organic material according to said pyramidal holes formed by said pyramidal hole creating step;

filling up a conductive material through said pattern in said pyramidal holes formed by said pyramidal hole creating step and then removing said pattern of said organic material to form pyramidal bump electrodes;

bonding said pyramidal bump electrodes onto said pad electrodes arranged on said semiconductor chip; and

separating said pyramidal bump electrodes bonded onto said pad electrodes of said semiconductor chip away from said base.

add  
A37

add  
C17